

WE CLAIM:

1. A method for producing a high loft, low density nonwoven web laminate, the nonwoven web having X, Y and Z dimensions, with the X dimension being a machine direction, the Y dimension being a cross machine direction and the Z dimension being a loft direction, comprising:
  - a) forming a group of crimpable, substantially continuous, spunbond, bicomponent fibers of A/B configuration and depositing the group of fibers onto a forming surface without the addition of heat to the fibers before deposition;
  - b) first heating the fibers at a time and a temperature sufficient to induce a relaxation of molecular orientation of one side of the fiber;
  - c) after the first heating, cooling the group of fibers below the temperature where the fibers will bond to each other and thereby inducing the fibers to crimp;
  - d) controlling or minimizing the forces which tend to impede crimping of the fibers when performing steps b) and c) whereby the fibers are allowed to crimp in the Z-direction; and
  - e) bonding the high loft, low density nonwoven web by a pattern bonding in a manner to substantially maintain its original loft.
2. The method according to Claim 1 wherein the bonding step of 1(e) is performed by pattern bonding the high loft, low density nonwoven web.
3. The method according to Claim 2 further comprising the step of placing the high loft, low density nonwoven web on a transportation sheet before pattern bonding.
4. The method according to Claim 2 wherein the pattern bonding is a point bonding.
5. The method according to Claim 4 wherein the pattern bonding is a 5% to 10% surface area pattern bonding.

6. The method according to Claim 5 wherein the pattern bonding is a spiral bond.
7. The method according to Claim 1 wherein the high loft, low density nonwoven web has a basis weight of less than or equal to 1.5 osy (50 gsm).
8. The method according to Claim 1 further comprising: treating the high loft, low density nonwoven web with a surfactant selected to improve the hydrophilicity thereof.
9. The method according to Claim 1 further comprising: bonding at least one XY planar surface of the high loft, low density nonwoven web to a liquid barrier substrate.
10. The method according to Claim 9 wherein the liquid barrier substrate is breathable.
11. The method according to Claim 10 wherein the breathable liquid barrier substrate is a microporous film.
12. The method according to Claim 1 further comprising: bonding at least one XY planar surface of the high loft, low density nonwoven web to an expandable substrate.
13. The method of Claim 12 wherein the expandable substrate is elastic.
14. The method according to Claim 12 wherein the expandable substrate comprises filaments.
15. The method according to Claim 12 wherein the expandable substrate comprises a nonwoven web.

16. The method according to Claim 12 wherein the expandable substrate comprises a film.

17. The method according to Claim 13 wherein the expandable substrate comprises filaments.

18. The method according to Claim 13 wherein the expandable substrate comprises a web.

19. The method according to Claim 13 wherein the expandable substrate comprises a film.

20. The method of Claim 12 wherein the expandable substrate is retractable upon the application of heat to the laminate.

21. A nonwoven material comprising:

a) a web of substantially continuous A/B bicomponent crimped fibers,  
b) the web having a percentage difference between a formation index of a top side of the web and a formation index of a wire side of the web of less than about 11%,  
and

c) the web subsequently being pattern bonded.

22. The nonwoven material according to Claim 21 wherein:

a) the web has a formation index averaging above about 37.6 on the top side of the web when the web has a bulk to about 0.1 inches in the Z axis, or wherein

b) the web has a formation index averaging above about 32.03 on the top side of the web when the web has a bulk of over about 0.1 inches in the Z axis.

23. The nonwoven material according to Claim 21 wherein:

a) the web has a formation index averaging above about 43.76 on the wire side of the web when the web has a bulk to about 0.1 inches in the Z axis, or wherein

b) the web has a formation index averaging above about 37.09 on the wire

side of the web when the web has a bulk of over about 0.1 inches in the Z axis.

24. The nonwoven material according to Claim 21 wherein:

a) the web has a formation index averaging above about 37.6 on the top side of the web when the web has a basis weight of up to 1.5 osy, or wherein

b) the web has a formation index averaging above about 32.03 on the top side of the web when the web has a basis weight of over about 1.5 osy.

25. The nonwoven material according to Claim 21 wherein:

a) the web has a formation index averaging above about 43.76 on the wire side of the web when the web has a basis weight of up to 1.5 osy, or wherein

b) the web has a formation index averaging above about 37.09 on the wire side of the web when the web has a basis weight of over about 1.5 osy.

26. The nonwoven material according to Claim 21 wherein:

i) the web has a formation index averaging above about 19.07 on the top side of the web when the web has a bulk of about 0.35 inches in the Z axis, or wherein

ii) the web has a formation index averaging above about 32.03 on the top side of the web when the web has a bulk of about 0.12 inches in the Z axis, or wherein

iii) the web has a formation index averaging above about 28.73 on the top side of the web when the web has a bulk of about 0.1 inches in the Z axis, or wherein

iv) the web has a formation index averaging above about 34.63 on the top side of the web when the web has a bulk of about 0.08 inches in the Z axis, or wherein

v) the web has a formation index averaging above about 37.6 on the top side of the web when the web has a bulk of about 0.07 inches in the Z axis.

27. The nonwoven material according to Claim 21 wherein:

i) the web has a formation index averaging above about 31.6 on the wire side of the web when the web has a bulk of about 0.35 inches in the Z axis, or wherein

ii) the web has a formation index averaging above about 37.09 on the wire side of the web when the web has a bulk of about 0.12 inches in the Z axis, or wherein

iii) the web has a formation index averaging above about 35.37 on the wire side of

the web when the web has a bulk of about 0.1 inches in the Z axis, or wherein

iv) the web has a formation index averaging above about 38.98 on the wire side of the web when the web has a bulk of about 0.08 inches in the Z axis, or wherein

v) the web has a formation index averaging above about 43.76 on the wire side of the web when the web has a bulk of about 0.07 inches in the Z axis.

28. The nonwoven material according to Claim 21 wherein:

i) the web has a formation index averaging above about 19.07 on the top side of the web when the web has a basis weight of about 6.0 osy, or wherein

ii) the web has a formation index averaging above about 32.03 on the top side of the web when the web has a basis weight of about 2.5 osy, or wherein

iii) the web has a formation index averaging above about 30.27 on the top side of the web when the web has a basis weight of about 2.25 osy, or wherein

iv) the web has a formation index averaging above about 28.73 on the top side of the web when the web has a basis weight of about 1.5 osy, or wherein

v) the web has a formation index averaging above about 31.07 on the top side of the web when the web has a basis weight of about 1.2 osy, or wherein

vi) the web has a formation index averaging above about 34.63 on the top side of the web when the web has a basis weight of about 1.0 osy, or wherein

vii) the web has a formation index averaging above about 37.6 on the top side of the web when the web has a basis weight of about 0.75 osy.

29. The nonwoven material according to Claim 21 wherein:

i) the web has a formation index averaging above about 31.6 on the wire side of the web when the web has a basis weight of about 6.0 osy, or wherein

ii) the web has a formation index averaging above about 37.09 on the wire side of the web when the web has a basis weight of about 2.5 osy, or wherein

iii) the web has a formation index averaging above about 35.03 on the wire side of the web when the web has a basis weight of about 2.25 osy, or wherein

iv) the web has a formation index averaging above about 35.37 on the wire side of the web when the web has a basis weight of about 1.5 osy, or wherein

v) the web has a formation index averaging above about 37.15 on the wire side of

the web when the web has a basis weight of about 1.2 osy, or wherein

vi) the web has a formation index averaging above about 38.98 on the wire side of the web when the web has a basis weight of about 1.0 osy, or wherein

vii) the web has a formation index averaging above about 43.76 on the wire side of the web when the web has a basis weight of about 0.75 osy.

30. The nonwoven material of Claim 21 wherein the fibers have a fiber denier of between about 0.1 dpf to about 9.0 dpf.

31. The nonwoven material of Claim 30 wherein the fibers have a fiber denier of between about 0.1 dpf to about 6.0 dpf.

32. The nonwoven material of Claim 30 wherein the fibers have a fiber denier of between about 0.1 dpf to about 5.0 dpf.

33. The nonwoven material of Claim 31 wherein the fibers have a fiber denier of between about 0.1 dpf to about 4.2 dpf.

34. The nonwoven material of Claim 32 wherein the fibers have a fiber denier of between about 0.1 dpf to about 3.3 dpf.

35. The nonwoven material of Claim 30 wherein the fibers have a fiber denier of between about 3.4 dpf to about 4.2 dpf.

36. The nonwoven material of Claim 35 wherein the fibers have a substantially white color.

37. The nonwoven material of Claim 36 wherein the fibers have a  $\text{TiO}_2$  percentage of about 0.1% to about 5%.

38. The nonwoven material of Claim 37 wherein the fibers have a  $\text{TiO}_2$

percentage of about 2%.

39. The nonwoven material according to Claim 21 wherein the fibers of the nonwoven web are integrally bonded.

40. A nonwoven material comprising:

- a) a web of substantially continuous A/B bicomponent crimped fibers;
- b) the web having a formation index averaging above about 37.6 on the top side of the web when the web has a bulk to about 0.1 inches in the Z axis, or
- c) the web having a formation index averaging above about 32.03 on the top side of the web when the web has a bulk of over about 0.1 inches in the Z axis; and
- d) the web subsequently being pattern bonded.

41. A nonwoven material comprising:

- a) a web of substantially continuous A/B bicomponent crimped fibers;
- b) the web having a formation index averaging above about 43.76 on the wire side of the web when the web has a bulk to about 0.1 inches in the Z axis, or
- c) the web having a formation index averaging above about 37.09 on the wire side of the web when the web has a bulk of over about 0.1 inches in the Z axis; and
- d) the web subsequently being pattern bonded.

42. A high loft, low density nonwoven web made according to the method of Claim 1.

43. A high loft, low density nonwoven web made according to the method of Claim 2.

44. A high loft, low density nonwoven web made according to the method of Claim 3.

45. A high loft, low density nonwoven web made according to the method of Claim 4.

- 46. A high loft, low density nonwoven web made according to the method of Claim 5.
- 47. A high loft, low density nonwoven web made according to the method of Claim 6.
- 48. A high loft, low density nonwoven web made according to the method of Claim 9.
- 49. A high loft, low density nonwoven web made according to the method of Claim 10.
- 50. A nonwoven web made according to the method of Claim 12.
- 51. A nonwoven web made according to the method of Claim 13.
- 52. A combination absorbent core wrap/spacer layer/surge material for an absorbent garment comprising a nonwoven web made according to the method of Claim 1.
- 53. A liner for an absorbent garment comprising a nonwoven web made according to the method of Claim 1.
- 54. An outer cover for an absorbent garment comprising a nonwoven web made according to the method of Claim 1.
- 55. A combination absorbent core wrap/spacer layer/surge material for an absorbent garment comprising a nonwoven web according to Claim 21.
- 56. A liner for an absorbent garment comprising a nonwoven web according to Claim 21.



57. An outer cover for an absorbent garment comprising a nonwoven web according to Claim 21.